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Inscribed Objects from Harappa Excavations 1986–2007

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Introduction

Ever since the discovery of the first engraved seals of the Indus Civilization at the site of Harappa, scholars have been trying to unlock the secrets of the Indus script[1] and to understand the social, economic, and political importance of these and other inscribed objects. Although the inscriptions have remained undeciphered, it has been possible to gain some insight into the context for the use of the script based on carefully documented recovery of inscribed objects from recent excavations throughout the greater Indus region. In this volume, we present for the first time in one place the assemblage of inscribed and incised objects discovered at the site of Harappa during excavations conducted between 1986–2007 by the Harappa Archaeological Research Project (HARP)[2].

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1 That "writing" and "script" are appropriate terms to employ in reference to what has commonly been called the "Indus script" has been contested by Farmer, Sproat and Witzel (2004). They argue that the Indus script is not likely to have been linked directly to a spoken language and was probably a system of non-linguistic symbols. We, however, contend that given the development in the system of inscriptions over time as seen at Harappa and given the extensive use of the "signs" or "symbols" both formally and informally and on many media (see text discussion), making the distinction between a language-based script and a not-so-tied-to-language symboling system is not a particularly interesting distinction. In any event, in the absence of multi-lingual texts, long texts, and/or a successor symboling system or script, there can be no widely accepted understanding of what the symbols or signs of the "Indus script" actually meant to those who employed them, and thus there can be no true resolution of this issue. As a result, we continue to employ terms like "script" and even "writing" in their broadest senses and are well aware that not everyone may agree with such usage. We are also rather imprecise in our use of the terms "inscribed" and "inscription", which we employ broadly in relation to the Indus script and not in the restricted sense of something engraved, incised, or written. Thus pieces with script in relief are also referred to as inscribed (although not "incised"). Finally the term "tablet" is used in the sense employed in all volumes of the *Corpus of Indus Signs and Inscriptions* to refer to small inscribed pieces specially made of stone, terracotta, faience, or copper – with images and/or script incised or in relief – that are not intaglio seals.

2 The Harappa Archaeological Research Project (HARP), a long-term program of investigations into the origins and character of Indus urban centers, was first initiated at Harappa by the late Prof. George F. Dales and Dr. J. Mark Kenoyer (Dales & Kenoyer 1993). In 1992, the original University of California-Berkeley project was transformed into the Harappa Archaeological Research Project directed by Dr. Richard H. Meadow (Harvard University) and Dr. J. Mark Kenoyer (University of Wisconsin-Madison), Co-Directors, and Dr. Rita P. Wright (New York University), Assistant Director. Research by HARP is conducted in collaboration with the Department of Archaeology and Museums, Government of Pakistan. We would especially like to thank that organization, its successive directors-general, the successive curators of the Harappa Museum, and the museum staff for facilitating our continued work at Harappa. Special thanks to all the colleagues who have participated in the

Table 1
Harappa Chronology

Period 1	Ravi (aspect of the Hakra) Phase	ca. 3700 BC – ca. 2800 BC
Period 2	Kot Diji (Early Harappa) Phase	ca. 2800 BC – ca. 2600 BC
Period 3A	Harappa Phase A	ca. 2600 BC – ca. 2450 BC
Period 3B	Harappa Phase B	ca. 2450 BC – ca. 2200 BC
Period 3C	Harappa Phase C	ca. 2200 BC – ca. 1900 BC
Period 4	Harappa/Late Harappa Transitional	ca. 1900 BC – ca. 1800 BC(?)
Period 5	Late Harappa Phase	ca. 1800 BC(?) – <1300 BC

Located in Sahiwal District, Punjab Province, Pakistan, the mounded ruins of Harappa are well known as the site of a major urban center of the Indus or Harappan Civilization (ca. 2600–1900 BC)[3]. Numerous excavations, both horizontal and vertical, have been conducted on the four major mounds (F, AB, E, and ET) and into the surrounding plain (*fig. 1*). A fifth mound lies under modern Harappa town and has not yet been excavated. With the use of radiocarbon dating as well as the comparative analysis of pottery, architecture, and other objects, it has been possible to define five major periods of occupation (*table 1*).

research at Harappa and have helped to collect and analyze data, including, among others, the late Dr. George F. Dales, Dr. Rita P. Wright, Dr. M. Rafique Mughal, Mrs. Barbara A. Dales, Dr. Heather M.-L. Miller, Dr. William R. Belcher, Dr. Qassid Mallah, Dr. Laura J. Miller, Dr. Sharri R. Clark, Dr. Bradley A. Chase, Dr. Randall W. Law II, Mr. M. Aasim Dogar, and Mr. M. Nadeem Ghouri, as well as to all other team members and members of our local excavation staff at Harappa. Our ongoing research at Harappa has been supported by numerous organizations, including the National Science Foundation, the National Endowment for the Humanities, the National Geographic Society, the Smithsonian Institution, the American School of Prehistoric Research (Peabody Museum of Archaeology and Ethnology, Harvard University), the University of Wisconsin, the American Institute of Pakistan Studies, www.HARAPPA.com, and private donors.

For cataloging, preparing, and sending original black and white negative and color positive photographs of the inscribed materials from HARP excavations to Asko Parpola for this volume, we particularly wish to thank Dr. Sharri R. Clark, Registrar of HARP, who also designed the HARP database into which have been entered details on each recorded object from the HARP excavations. Of great assistance in this effort have been Mrs. Barbara Dales (former Registrar) and especially Mr. M. Nadeem Ghouri (Assistant Registrar). Once reliable equipment to digitally scan images became available, Ms. Julide Aker, followed by Mrs. Aysun Atici, and Ms. Sheetal A. Patel have scanned almost all of the thousands of HARP color images into a photo database, which upon completion, will be linked to the HARP object database. Most of the HARP photographs reproduced in this volume were taken by Dr. Richard H. Meadow, with a few contributions by Prof. J. Mark Kenoyer, Mr. Georg Helmes, and Ms. Charlotte Schmid-Meybach, the latter two who served as photographers at Harappa from 1987–88 and 1988–90, respectively.

Finally, we wish to express our deepest gratitude to Prof. Asko Parpola, for whom this volume has clearly been a labor of love as well as something of an albatross around his neck (Samuel Taylor Coleridge, 1798, *The Rime of the Ancient Mariner*). The set of three volumes bearing *Corpus of Indus Seals and Inscriptions* in their titles represent a definitive resource for the study of the Indus script and of script-bearing artifacts. They are monuments to Asko Parpola for his foresight, efforts, stamina, and patience in preparing a compendium to which we can all refer with confidence.

3 All ages cited in this essay approximate calendar years based on calibrated radiocarbon determinations.

Harappa Excavations 1986–2001 Showing Location of Trenches

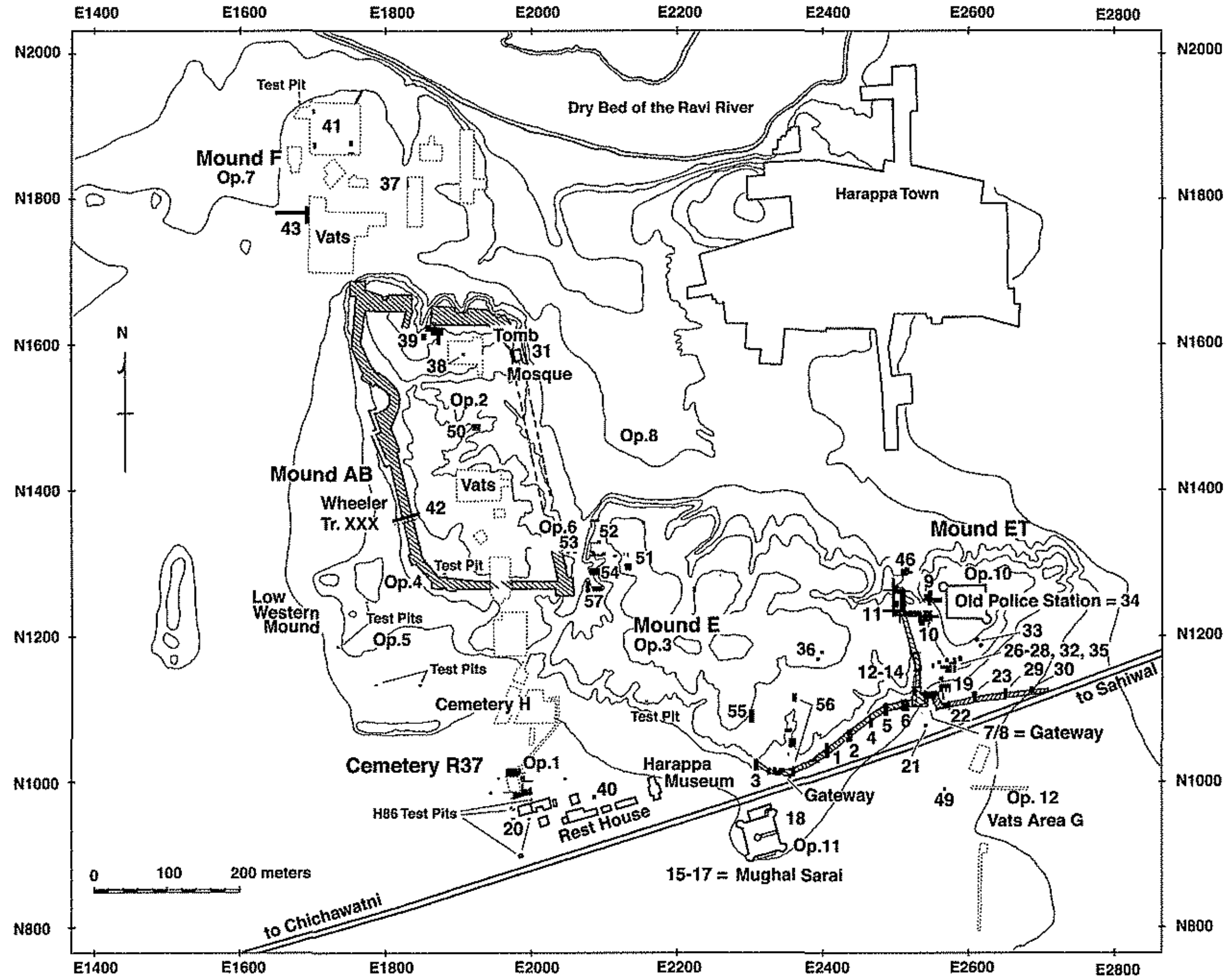


Fig. 1. Harappa Excavation Areas 1986–2001.

Through systematic recovery procedures, careful stratigraphic recording, and spatial analysis,[4] we have been able to assemble information that is beginning to permit us to suggest in-

[4] Each of HARP's excavation units has a unique identifying number and was individually described in fieldbooks in which, among other features, stratigraphic relationships were noted. In addition, the limits of each unit were recorded in two dimensions in relation to a site-wide benchmark as well as in elevation above sea level. When recovered in place, individual objects, including many inscribed pieces, were similarly recorded. Finally, all excavated sediments, with the exception of some surface deposits, were screened through 2 mm mesh to ensure reliable and standardized recovery across the site. Strategically selected sediments were floated for paleoethnobotanical materials and water sieved for recovery of, for example, the debitage of seal and tablet manufacture.

For HARP recorded objects, the following designations were assigned in sequence: H (HARP) Year of excavation – Registration number / Excavation unit (Lot) number – item number, e.g., H99-4064/8796-1 for seal H-1657 herein. (In the data list at the end of this volume, this identifying designation is given as H99-4064 8796-0001 with a space between the registration number and the excavation unit number.) All objects with a registration number are in the reserve collection of the Harappa Museum and all other recorded objects are kept in storage facilities at Harappa, unless they are on loan to other venues. (In the conventions used herein, objects without a registration number have only four numerals between the year and the item number, these representing the excavation unit. The combination of excavation unit number and item number is, in itself, a unique identifier, just as the registration number alone is a unique identifier, although it is the excavation unit number that provides the direct link to the archaeological context as recorded in the excavation records.)

terpretive models for understanding the role of inscribed objects in the economic, social, political, and ideological structure of the Indus Civilization. Many of these have been published in the course of discovery and analysis.[5] A brief summary of some of our findings is presented below together with some new observations regarding the stylistic changes and chronology of seal carving and boss types.

In the catalog presented in this volume, to the degree of specificity possible given the current state of analysis,[6] we have assigned a chronological period to an inscribed object based on the stratigraphic and associated artifact information from its find spot. When an inscribed object has been recovered from redeposited sediment, it often can be associated with a particular period based on its material, style, carving technique, iconography, etc. For example, Ravi or Early Harappan pottery with graffiti[7] that has been found in mixed context can be identified based on the nature of the ceramic ware, shape, and/or decoration and assigned to the period for which those ceramic features are characteristic. With seals this is more difficult, particularly with geometric or button seals. One example is the specimen H-1537 that was originally assigned to Period 2. After layout of the plates for this volume was completed, microscopic analysis of the tool marks on the inscribed surface and comparison with seals from secure contexts suggests that this seal actually is probably from Period 3C. Another object (H-1539) that we initially thought to have been intentionally marked is a lump of low fired-clay that bears multiple incised parallel lines. Re-examination has revealed that these lines may in fact be the result of markings made by a small animal (perhaps a bird or rodent) and not the result of intentional human modification.

General Site Chronology and Highlights of the Excavations

Beginning as a small village that was established ca. 3700 BC on an elevated river terrace between the Ravi and the old Beas Rivers, the ancient settlement we today designate as Harappa grew to become a small town with two major walled areas by ca. 2600 BC. Over the next 700 years during the Harappa Phase, ca. 2600–1900 BC, the city expanded with the construction of several walled suburbs and extra-mural occupation areas, covering an area of more than 100 and perhaps as much as 150 hectares (Meadow & Kenoyer 2005).

The Early Harappan periods

The Ravi Phase represents the initial occupation of the site (Period 1: ca. 3700 – ca. 2800 BC) and has cultural similarities with early settled communities in the Ghaggar-Hakra River valley to the east, as well as in many small regional cultures in the piedmont and highlands of Baluchistan to the west. Evidence from the analysis and sourcing of the raw materials used for chipped-stone and ground-stone manufacture, bead making, and shell bangle production indicate that the site was linked to distant resource areas throughout the Indus region (Kenoyer & Meadow 2000). There is also evidence to suggest strong trade links to regions north of

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5 See the Bibliography.

6 As detailed study of the fieldnotes, plans, sections, photographs, drawings, artifacts, and ecofacts is completed for the different excavation areas, it will be possible to ascertain the chronological placement of many of the inscribed pieces to a greater degree of specificity than is presented in this volume.

7 Graffiti are signs that were incised into an object following manufacture of that object. The most commonly preserved media for graffiti are ceramic vessels, most of which have been found only as fragments (sherds).

Harappa, both in the alluvium and in the mountainous regions of Hazara and NWFP (Law 2005; 2008). Other crafts such as bone working, pottery making, and mud-brick architecture construction were also evolving during this early occupation as was the use of pre-firing "potter's marks" and post-firing "graffiti" on pottery, indicating that concepts of graphic expression using abstract symbols were emerging (Kenoyer & Meadow 2000).

Over time, the economic and political importance of this small community resulted in its growth and expansion during the Kot Diji (Early Harappa) Phase (Period 2: ca. 2800–2600 BC). During this period, Harappa became a large settlement, possibly a regional center, integrating its hinterland and obtaining raw materials from new resource areas (Kenoyer 1997), although an emphasis on northern resources continued to be important (Law 2005; 2008). The use of pre-firing potters' marks and post-firing graffiti on pottery became more widespread, with clear evidence for the use of multiple signs that continued to occur and evolve through the Harappa Phase (Period 3). These, we believe, represent an Early Indus symboling system or script that had become clearly differentiated from potters' marks (Kenoyer & Meadow 1996; 1999; Kenoyer 2006). Furthermore, it was during this phase that standardized cuboid stone weights, terracotta tags impressed by inscribed seals, and steatite seals with animal and geometric motifs came to be employed.

The Harappan periods

Although many urban characteristics of Harappa began during the Kot Diji Phase, it was in the following Harappa Phase (Period 3: ca. 2600–1900 BC) that the settlement became a major urban center, expanding on previously established links to other areas of the greater Indus Valley and beyond (Meadow & Kenoyer 1997). With the rise of the Indus cities, technology and craft production increased in sophistication and scale of production. The use of what seems to be a relatively standardized form of the core Indus script became more common, being employed on seals as well as on a wide range of other artifacts including tablets, tools, ornaments, and various types of pottery. The signs and symbols were carved, incised, chiseled, inlaid, painted, molded, and embossed on a variety of (preserved) materials including terracotta, ceramic, stoneware, and glazed faience; shell, bone, and ivory; sandstone, steatite, and gypsum; copper and copper alloys, silver and gold.

While the use of signs on Indus seals is fairly well studied, until recently there have been no systematic studies of their use on other kinds of objects due to the small numbers of such objects or their fragmentary nature. These different kinds of inscribed artifacts are now being studied spatially and chronologically and compared with seals from similar contexts and periods. Although we are still only at the beginning of this study, it seems that signs on seals and tablets usually reflect a more formal use of the script while those on other artifacts may be more informal and even, in some cases, represent the more spontaneous use of various signs. Spontaneity is particularly likely for graffiti on ceramic vessels, which were incised with script after manufacturing and firing. This use of signs clearly demonstrates that it was not only craftsmen commissioned to prepare formal devices who incised the script, but also others who employed it directly to label a container with perhaps one or more of the following: the name of its owner, the nature of its contents, its origin, its destination, or an incantation – to name some of the more obvious possibilities. Regrettably, most examples of ceramic vessels with incised signs are broken, with the inscription only partially preserved on the recovered sherd(s).

This provides a challenge in trying to investigate what degree of overlap there may be in sign sequences between graffiti and inscriptions on seals, tablets, or other media.

Much of our recent work at Harappa has focused on understanding the details of cultural developments during Periods 3B and 3C. Results reveal these to have been dynamic periods of urban expansion together with recurrent decay, rebuilding, and reorganization in different parts of the city. In 2000 and 2001, excavations turned to recovering more information on Period 3A in order to reveal initial Harappa Phase developments, particularly relating to the use of inscribed pieces. This period is poorly represented in excavations at most Indus sites, because the remains are buried under later occupation levels. At Harappa, it has been possible to recover two seal fragments from Period 3A, providing an important baseline against which to evaluate stylistic and technological change in the use of seals (see below for more discussion). Based on evidence at hand to date, square seals with script together with the unicorn or other animal motifs are associated primarily with the later part of Period 3A and are relatively common throughout Period 3B and on into Period 3C (Meadow & Kenoyer 1997). Square seals with script alone are found first in Period 3B, but long rectangular seals with script alone are confined to Period 3C.

We are also obtaining important chronological information with respect to inscribed tablets, which are particularly common at Harappa, more so than the seals. Through careful stratigraphic cutting-back of Vats' section in Trench I of Mound F and comparison with his report of that trench (Vats 1940), we have determined that he was not correct in reporting that small steatite tablets with incised script are from the earliest levels of the site. Instead it is evident that such tablets appeared toward the middle of Period 3B and continued to be used well into Period 3C (Meadow & Kenoyer 1997; 2000). Furthermore, these inscribed steatite tablets, which Vats (1940) called "tiny steatite seals", are not seals at all but are incised with script that was to be read directly from the tablet. And along with the steatite tablets are found terracotta and glazed faience tablets with molded bas-relief script, motifs, and narrative scenes, which also start appearing in mid-Period 3B and continue into Period 3C (Meadow & Kenoyer 1997; 2000).

While many of the tablets are rectangular in form, others were made in circular, half circle, or fan shapes and even in the form of trees, fish, hares, or other animals. Most tablets are flat in cross-section, but others are triangular, deeply rectangular to square, plano-convex, biconvex, or almost cylindrical (e.g., this volume: H-1956 & H-1957 and H-1979, H-1980 & H-1981). This last form has led to much confusion in the literature as they are often incorrectly referred to as cylinder seals. So far, no true cylinder seals have been recovered from the HARP excavations, although the Central Asian type of cylinder seal is reported from earlier excavations and from other sites (Parpola 1994).

Unlike seals, almost all of which are unique, an important aspect of tablets is that, at Harappa (as well as at Mohenjo-daro), there are numerous instances of (1) incised steatite tablets with copies of the same signs and/or motifs and (2) duplicate bas-relief tablets of faience or terracotta made from the same mold (e.g., Meadow & Kenoyer 2000). The molds themselves could have been made of wood or clay or stone, and seem also to have included seals (e.g., this volume: H-1130 through H-1132 and H-1951A).[8] Copies of incised tablets and

[8] In addition, there are rare examples of bas-relief tablets with the same sign sequences or motifs but made from different molds (e.g., CISI 2: H-723 and CISI 1: H-182A and H-182B) as well as numerous examples of the same series of what are often designated as numerical signs also made from different molds (e.g., this volume: H-1817B, H-1830B, H-1832B, etc.).

duplicates of molded tablets have been found in large numbers in two noteworthy instances at Harappa: (1) script copies incised into 22 rectangular steatite tablets, triangular in section, from secondary deposits of Period 3B on the outside of the perimeter wall in Trench 11 on the East side of Mound E (Meadow & Kenoyer 2000, fig. 4; this volume: H-2218 through H-2239) and (2) 31 duplicates bearing iconography and script, made of rectangular molded terracotta, biconvex in section, from the northern portion of Trench II in Area G (Vats 1940: 195; CISI 1: H-252 through H-265 and H-276 & H-277; CISI 2: H-859 through H-870; this volume: H-1155). Other copies and duplicates have been found scattered across the site where, like the multiples above, they are always found in trash, fill, or street deposits. Why tablets were made, how they were used, and why they were discarded remain intriguing unanswered questions. Their intrinsic interest lies not only in the script that they often bear, but even more so in the iconography, which provides an important glimpse, however fragmentary, into details of Harappan ideology, particularly for the time frame from ca. 2400 to ca. 2000 BC (Harappa Period 3B through much of Period 3C). For a more detailed discussion see Meadow & Kenoyer 2000.

Two other forms of inscription that should be mentioned are (1) impressions stamped (originally) on soft clay used to seal a container (pot, box, room, etc.) and (2) imprints stamped on a ceramic vessel before firing. Very few of the first have been recovered from Harappa, or indeed from any Indus site with the notable exception of Lothal where 93 specimens were retrieved clustered mostly in the area of a structure termed a "warehouse" by the excavator (see Frenez & Tosi 2005 for a review of this material). From the HARP excavations, only six sealings or "tags" have been identified (H-1719 through H-1724), all of which were partially hardened through low firing, possibly in a hearth, hot ashes, or rubbish fire. Due to the secondary contexts of the sealings, it is not possible to determine if the hardening was done intentionally as a way to archive a sealing or unintentionally as a part of post-deposition processes. A seventh impression in the form of a sub-conical "jar-stopper" (H-1725), however, was recovered in completely unbaked condition. Only immediate intervention by HARP object conservators was able to keep this specimen from disintegrating because of crystallization of the salts in the raw clay upon drying. At Harappa as at Lothal, it was the at-least-lightly-baked condition of the tag fragments that permitted them to be recovered intact. Unbaked specimens that are not immediately recognized as impressed are likely not to be preserved at many Indus sites, which may go some way toward explaining why such seal impressions have rarely been recovered in the Indus area.

More common than seal impressions on tags are imprints with script on ceramic vessels that were stamped before firing. These are found almost exclusively on those Harappa Period 3C vessels called "pointed base goblets" or PBGs (see H-1081 and H-1082 for nearly complete and complete examples). To judge from the quantities of sherds recovered at Harappa, such vessels were mass-produced in the tens if not hundreds of thousands. A very small percentage of the PBG vessel fragments recovered by HARP bear impressed stamps with one or more signs (H-1727 to H-1766). The seals used to make these imprints are of the long rectangular form found only in Period 3C, just as PBGs are also found only in that chronological period (ca. 2200–1900 BC). Six sherds of PBGs with identical stamped imprints as those herein illustrated as H-1756 to H-1759 have also been recovered from the site of Lahoma Lal Tibba located ca. 24 km ESE of Harappa (Wright 2009, fig. 5.11). These provide strong evidence for the distribution of ceramics between Harappa and smaller settlements in its hinterland.

The Late Harappan period(s)

The Late Harappan or Cemetery H levels at Harappa date from approximately 1900–1700 BC (based on HARP excavations and radiocarbon dates), although the Cemetery H occupation may continue to as late as 1300 BC or even 1000 BC based on excavations in other parts of the greater Indus region (Kenoyer 2005). Early and mid-twentieth century excavations of material from this time period at Harappa were concentrated in the cemetery area south of Mound AB extending east along the southern edge of Mound E. Very few preserved habitation areas remain due to the extensive brick robbing of the upper levels of the site. However, some areas with partial structures and *in situ* floors have been discovered, revealing the use of smaller-size fired bricks that, however, still maintain the traditional Harappan height:breadth:length ratio of approximately 1:2:4. Other discoveries relate to crafts such as pottery making and to faience, glazed, and stone bead production. These Late Harappan domestic structures and associated floors have provided valuable information about the nature of early second millennium BC subsistence, architecture, and everyday life. Instead of having been abandoned, the settlement appears to have been thriving, albeit much reduced in size, and it remained part of important cultural, economic, and ideological transformations. However, there is no indication of the use of inscribed seals, or indeed of formalized inscriptions of any kind, during this period. Some Late Harappan ceramics have post-firing graffiti, but the abstract symbols do not represent a continuation of the Indus script system as has been argued for sites such as Lothal (Rao 1991).

These recent discoveries by HARP at Harappa indicate that there were significant changes in the style of the script and also in the types of objects on which Indus signs were executed during the emergence, expansion, and transformation of the Indus cities. In other words, the Indus script did not appear fully formed and remain unchanged for more than 700 years. Some specific features of these changes in the style of inscribed objects are discussed in more detail below.

Seal Carving – Chronological Changes in Technology and Style

No seals of types that later came to be characteristic of the Indus Civilization have been recovered from the earliest Ravi Phase occupation at Harappa. That said, there is a single fragment of a bone seal with a perforation near the center (H-1521), the design of which was carved deep into the soft inner portion of the bone, leaving the hard outer surface in relief. Because of slight burning and weathering, it is difficult to know if this button seal was used to stamp anything or was only used as an ornament.

Carved intaglio seals and seal-impressed clay are first seen at Harappa during the Early Harappan, Kot Diji Phase (Period 2: ca. 2800–2600 BC). One unfired and unfinished steatite intaglio seal fragment (H-1533) was found in a well-defined sealed stratum that can be securely dated to that phase based on ceramic associations. This broken seal has a roughly incised elephant that was probably only partly completed before the seal broke. The boss on the back is missing, but traces of a drill hole indicate that the seal had such a boss before it was damaged. The blank for this seal seems to have been sawn from a larger blocklet of steatite

and then ground to make a smooth flat surface on one side. Deep grinding striae are present on both the obverse and the reverse of the seal.[9]

A second unfired seal (H-1534) that we attribute to Period 2 comes from a mixed context near to the occupation surfaces where a number of *in situ* Period 2 inscribed objects have been discovered. The seal has a relatively simple geometric design of four intersecting lines that create eight triangular sectors on the seal. The edges and surface of the seal are smoothed and rounded, but there are numerous manufacturing or grinding striae that are still visible. The seal may have been used to impress clay or some other material, and the perforated boss on the back may have been used to hold a cord. The boss itself is off-center and cracks in the back of the seal suggest that there may have been some kind of flaw in the stone with the boss being offset to compensate for the problem. The motif incised onto this seal is broadly similar to motifs inscribed on pottery sherds attributed to the Kot Diji Phase (Period 2) (H-1620 to H-1623).

Three fired steatite button seals of Period 2 reveal very different types of carving as well as glazing or possible glazing. One of these (H-1535) has five deeply incised circle and dot motifs around and within a centered a four-pointed star. Variations on this motif have been found at other Kot Diji or Early Harappan sites, such as Tarakai Qila (Trq-2 in CISI 2, p. 414), Kalibangan (K-57 in CISI 1, p. 309), Kunal (Khatri & Acharya 2005), and Rahman-dheri (Durrani, Ali & Erdosy 1995: 203, fig. 2). These seals all have similarly roughened or matte surfaces that may be the result of the erosion or flaking off of an original surface glaze. Although no trace of glaze is seen on this particular seal from Harappa, the same type of surface is seen to occur beneath the glaze on many fired steatite beads where the glaze is partially preserved. The similarity between sites in design motifs and in the sharply delineated edges of the designs suggests the existence of a well-defined carving style across the northern part of the Indus area. Such a style may reflect a single workshop or perhaps seal carvers who were trained originally in one workshop and then developed their own ateliers at other sites.

In contrast to the crisp style of the carving on seal H-1535 is the rougher style evident on small square seal H-1536 and a circular button seal discussed below. Seal H-1536 has incised lines with uneven edges and striae from the incising tool. This seal still has traces of glaze both on its surface and inside the roughly incised grooves. Applied glaze is able to adhere more firmly to a rough surface and this may explain why the glaze is still preserved on this seal. Glazes on seals from Harappa have not yet been analyzed, but appear to be from silica applied to fired steatite as is seen on some beads beginning with the Ravi Phase. To make the decoration of this seal, a double "V" was incised across the middle of its squared outline and three triangles were carved out to complete the motif.

This glazed button seal was found along with another circular incised button seal that is decorated with a single set of concentric circles on one surface (not photographed for the corpus, but illustrated below as H-2587 in a 100% line drawing in *fig. 2.1* after Kenoyer and Meadow 2008: 127, fig. 4.3: maximum diameter 15.29 mm, H96/7158-01). It also was made from steatite and has traces of a blue green glazed surface. This circular ornament has two parallel holes through the body of the disc and no knob on the back. Both of these button seals are distinct from the types found at other Early Harappan sites, and therefore may have been produced in a workshop at Harappa itself.

9 To judge from preliminary analysis of working marks on unfinished seals mostly from Harappa Period 3, craftsmen making such objects probably used a range of specialized tools such as fine denticulated copper / copper alloy saws, stone and metal incising tools, stone or metal drills, and various grades of grinding stones ranging from coarse to fine.



1 2

Fig. 2. **(1)** Button seal H96/7458-0001 = H-2587 (100%). **(2)** Button seal H98-3493 8314-0001 = H-2588 (100%). – After Kenoyer & Meadow 2008: 127 fig. 4: 3 and 4.

Harappa Phase Carved Seals

Only two seals, both incomplete, have been recovered from the lowest levels of the Harappa Phase (Period 3A). One example (H-1688) is a broken steatite seal from street deposits on Mound E, dating to ca. 2600 BC. (Kenoyer 1991; Dales, Kenoyer et al. 1991, fig. 13.44e). The style of carving is bold and angular, consisting of a single sign above the rump of a bovine, which, to judge by comparison with a complete seal from the site of Farmana in Haryana, might be a water buffalo (Shinde et al. 2008: 104, fig. 107). The deeply carved V-shaped sign or symbol has not been found on any later seal, but a rounder and more symmetrical form does occur on molded tablets. The animals carved on later seals also are more naturalistic with smooth contours that reflect the actual muscles of the animal.

The second Period 3A seal fragment from Harappa (H-1689) comes from a deposit on the western edge of Mound E that was found to contain both Early Harappan and Harappan pottery. This seal has an elephant motif with naturalistic lines and may represent the development of seal carving styles at the end of Period 3A or the beginning of Period 3B. Further well-dated examples are needed to clarify the earliest style of seal carving, but these two seal fragments from Harappa, and the examples from Farmana, suggest that styles of carving seals evolved over time and that some of the signs also changed over time.

Our excavations have recovered unfinished and finished seals from contexts some of which can be accurately dated and associated with specific activity areas at Harappa. Unfinished seals have been recovered from across the site, and through detailed comparisons, it may be possible to identify specific workshop styles and changes in carving techniques. One of the unfinished unicorn seals (H-1683), a fragment of which was found on the northeastern slope of Mound E, has such a distinctive style of carving used for the ritual stand – as well as for the unicorn's collar, ear, and horn – that it should be readily identifiable on finished seals. Indeed, a comparable carving style is seen on a finished unicorn seal (H-1682) from a Period 3B context in a nearby trench on the eastern edge of Mound E some distance from where the unfinished seal was found.

Silicone impressions have been taken of all seals with well-preserved surfaces, and fine-grained molds from these can be used to make high-resolution photographs with a scanning electron microscope (Kenoyer 1997; 2003). This technique provides the means to identify distinctive features of tool marks and cutting angles, which then can be compared between seals. Such a process can lead to the definition of tool types and even to identification of specific tools and special features of carving technique, all of which can assist us to understand the

nature, development and even the organization of seal-carving traditions. Already we can suggest, based on the recovery of unfinished seals with only the animal motif present, that this part of the seal was carved first, followed by the script. Going further, using the evidence provided by detailed characterizations of carving style and technique, it may be possible to determine if one artisan carved animal motifs while another artisan specialized in carving the script. In the end, it may also be possible to define specific workshops and even individual artisans.[10]

One rare example of a seal without any animal motif (H-1692) was recovered in a dustbin outside of a house at the northeastern edge of Mound E. The house associated with this structure can be dated to Period 3B, and this seal may represent an early example of what was to become the long rectangular seal with script (e.g. H-1704 to H-1715) that became quite common in subsequent Period 3C. This early example, however, is only slightly longer than it is wide and has the grooved boss typical of seals with animal motifs. Examples of similar types of seals have been reported from Mohenjo-daro (CISI 1, p. 78: M-313, M-316, M-315) and Lothal (CISI 1, p. 251: L-56, L-58, L-59), but for those sites the context and dating of such seals are not well understood.

Chronological Aspects of Boss Types

One important feature of seals that is worth further study is variation in styles of perforated bosses used to string or hold seals. Based on the stratigraphic and chronological contexts of seals found from Harappa, there appears to be significant changes in the types of boss used during different periods and on different types of seals. In this introductory section, we present a summary of the major types and provide some comparative examples from other sites.[11]

So far no complete button seals have been found from the Ravi phase (Period 1), but the carved bone button seal fragment (H-1521) has a hole in the center like button seals found from the Chalcolithic deposits of Mehrgarh (CISI 2, p. 403: Mr-10 to Mr-14) and the carved ivory button seal from Rahman-dheri (CISI 2, p. 352: Rhd-1).

Two types of attachment devices have been found on the button seals from the Kot Diji Phase (Period 2) levels. Four of the button seals have evidence for a raised knob or boss on the back, but one circular button seal (Kenoyer & Meadow 2008: 127, fig. 4.3 – illustrated above in *fig. 2*) has two parallel holes through the body of the disc and no knob on the back. Of the seals with evidence for a boss, two examples have a raised circular knob with a flat end and the perforation passing laterally through the knob (this volume: H-1535, H-1536). As noted above, similar seals have been reported for sites such as Tarakai Qila, Kalibangan, Kunal, and Rahman-dheri. Also as noted previously, an unfinished geometric seal (H-1534), found in a mixed context but attributed to Period 2, has what appears to be a repaired knob where a portion may have cracked off the back and an attempt made to prepare an off-center perforated knob. Traces of a similar type of knob fragment are seen on the back of the unfinished elephant seal that comes from a sealed context of Period 2 (H-1533 and Kenoyer & Meadow 2008: 127, fig. 4.8).

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[10] This type of study is being undertaken (2009–2010) for Harappa by J. M. Kenoyer and extended to other sites by University of Wisconsin–Madison graduate student Gregg Jamison.

[11] A more comprehensive study of seal boss evolution and variation is underway (2009–2010); this analysis will provide additional contextual information and also deal with the many variations.

During Harappa Phase Periods 3A and 3B, the most common form of boss for most seal types is the circular dome-shaped boss with a single central groove. Rarely this type of boss has a double groove, as at the site of Gola Dhoro (Bagasara), Gujarat (Bhan et al. 2005). The perforation is generally oriented horizontally in the same direction as the script and animal motif. The drilling for the perforation is done from both sides and angled down so that the hole meets deep inside the seal body rather than at the level of the boss itself. This drilling technique was necessary to avoid weakening the small area where the boss joins the seal body. Nevertheless, a common form of seal breakage is detachment of the boss because of the weak structure of steatite itself.[12]

Another form of boss found during Harappa Phase Periods 3B and 3C is usually on steatite seals with geometric designs such as circle and dot motifs (H-1700, H-1702). The boss is a simple raised square with a flat or convex surface and a transverse perforation. Similar types of bosses are found on a variety of faience button seals also dated to Periods 3B/C and 3C.

During the final phase of the Harappan occupation (Period 3C) the single grooved boss continues to be used on square seals. On the long rectangular seals, however, there is no separate knob, with the perforation being drilled transversely through the sides of the central and thickest part of the seal.[13] There are a few exceptions to this pattern and two of the long rectangular seals recovered in earlier excavations from Harappa have a grooved knob or boss on the back (CISI 1, p. 203: H-161, H-162).

Another form of boss that appears in period 3C is a domed or convex form found on square geometric seals. The domed back is usually decorated with concentric circles or floral motifs. Two seals of this type were found in mixed contexts and erroneously attributed to Period 2 in earlier publications (Kenoyer & Meadow 2008: 127, figs. 4.4 and 4.5 = H-2588 in *fig. 2.1* above and H-1537). Recent analysis of the carving technique and the nature of the glazed surface suggest that these seals do not date to Period 2, but should be associated with Period 3C. This type of boss has not been discovered in the Early Harappan (Harappa Period 2) levels at any other site in the greater Indus region. This style of carving on the domed boss is common on circular seals associated with the Persian Gulf region. The circular seal from the area of Lothal with four circle and dot motifs on its face, however, has a triple incised line across its domed boss (CISI 1, p. 268: L-123).

There is one example from Harappa of a circular button seal (H-1703) with a raised circular boss with a flat top, but this seal was found in surface deposits and thus its chronological placement cannot be determined. It is possible that it dates to the Late Harappan or post-Harappan period based on broadly similar geometric button seals from the site of Chanhu-daro during the Jhukar or Late Harappan period (Mackay 1943, Pl. XLIX) and from Pirak dating to the post-Harappan period (Jarrige, Santoni & Enault 1979; CISI 2, p. 381: Pk-15 to Pk-17).

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[12] If this happened while a seal was hanging on a cord worn at the waist or neck, the seal could easily have been lost in the street as a person was traveling through the city. While a number of seals are found broken into two or more pieces in dumps and in the streets, other inscribed pieces from similar contexts are complete. Although it is possible to suggest that some devices may have been broken intentionally in order to cancel them out and prevent someone else from using them, this does not seem to have been a universal phenomenon.

[13] One reason that this innovative design may have been developed was to ensure that a seal would more or less self-destruct if the perforation were broken. In other words, there was no way you could lose a complete seal if the perforation broke. The seal would have been snapped in two pieces and thereby rendered unusable (e.g. H-1704).

Conclusions

When both seal carving styles and boss types are considered together, there is good evidence for an evolution in seal forms over time. Whether there were parallel changes in the script needs to be investigated in detail. In the past, studies of the Indus script have lumped all of the best-preserved seal inscriptions together and used this combined assemblage as the basis for a study of the script. Based on the discoveries at Harappa, it is now possible for that site at least to separate out different chronological periods of seal production and to compare seal inscriptions with those found on other types of objects such as incised and molded tablets and pottery, which together greatly outnumber the seals and seal impressions recovered from the site.

The use of Indus signs on distinctive types of objects as well as upon ornaments and pottery indicates common cultural practice at sites of the Indus Civilization. This shared practice may be a reflection of or have played a role in the integration of populations within and between urban centers as well as with communities spread out across rural areas, along trade routes, and in resource areas. Especially as new excavations produce stratigraphically controlled and well-dated inscribed pieces, it becomes both possible and increasingly important that the script and accompanying iconography be subjected to rigorous analysis at the site, regional, and cross-regional levels to investigate trends of change through time and variability across space. When such studies have been carried out, assumptions about the uniformity of the signing system (Parpola 1994) probably will need to be revised. Even though these new discoveries will not lead to a decipherment of the Indus script, any new patterns that can be discerned at Harappa and at other sites where close stratigraphic and spatial documentation has been possible, will help us to better interpret the role of the script in the Indus world.

In our opinion, too much scholarly (and lay) emphasis has been placed on the unattainable goal of decipherment of the Indus script and not enough on treating seals, tablets, and other inscribed materials as archaeological finds that went through processes of materials selection, production, use, and discard. Choices were being made throughout the birth, life, and death of inscribed objects, choices that are encoded in the objects themselves or in the archaeological contexts from which they have been recovered. We have the knowledge and techniques available to identify and decode some of these choices through the study of individual and patterned activities. That is where our focus should lie. The volumes of the *Corpus of Indus Seals and Inscriptions* are a resource that can help this to happen.

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